

APPENDIX U

RESOURCE MONITORING AND EVALUATION PLAN

The resource monitoring and evaluation plan (Table U-1) lists the key resources that will be managed by the Garnet Resource Management Plan (RMP). For each resource there are a series of items that will be monitored. Each item is evaluated by location, technique for data gathering, unit of measure, and frequency and duration of data gathering. When duration is not specifically stated, the duration is for the life of the plan.

The monitoring and evaluation plan states the event that will signal an unacceptable impact to the resource. When such an event is noted, the management action associated with the event will be evaluated. If the adverse impact can be corrected by a management action that is within the scope of the RMP, the change will be implemented. If the adverse impact can be corrected only by a management action that is outside the scope of the RMP, the management change will be the subject of a formal RMP amendment.

TABLE U-1
Resource Monitoring and Evaluation Plan

Element	Item	Location	Technique ¹	Unit of Measure	Frequency and Duration	Info. Warranting a Decision Change
Vegetation	condition	all M&I allotments	as outlined in SCS National Range Handbook Section 305 ²	% pounds production compared to climax allowance	end of each grazing cycle	condition is reduced one class
	trend	a. all M&I allotments	canopy-coverage (Daubenmire), ³ soil surface	change in % of surface area	a. end of each grazing cycle	decrease of 10 percentage points from base data
		b. any allotment where adjustment in preference is proposed	factor (MSO-7100-1), ⁴ photos		b. first and fifth year, then on 5 yr. interval	
	cover	M&I allotments	canopy-coverage (Daubenmire), ³ photos	% of surface area	end of each grazing cycle	decrease of 10 percentage points from base data
	utilization	M&I allotments	key forage plant ⁵	% forage removed	annually at end of grazing cycle	utilization more than 50% on native grasses
	precipitation	M&I allotments	site specific rain gauges, RAWs units, ⁶ NOAA data ⁷	inches of precipitation	monthly during growing season	consider with temperature data to determine utilization level
	temperature	M&I allotments	NOAA data, ⁷ RAWs data ⁶	degrees F or C	monthly during growing season	consider with precipitation data to determine utilization level

Element	Item	Location	Technique ¹	Unit of Measure	Frequency and Duration	Info. Warranting a Decision Change
Cultural Resources	site vandalism	area wide for sites eligible for nomination to the Register of Historic Places	site inspection	number of sites disturbed	once yearly during snowfree season	any noticeable trend indicating increased site disturbance such as ground disturbance, modification of structures, etc.
	environmental degradation, movement of artifacts as a result of erosion and trampling	area wide for sites eligible for nomination to the Register of Historic Places	site inspection and photo plot-measurement method using closeup photos and measurements to show quantitative changes in the distribution of artifacts	number of artifacts displaced or altered per square yard	once a year	any disturbance involving sites eligible for nomination to the Register of Historic Places
Commercial Forestland	stocking	all regenerated stands either natural or planted	stocking survey ⁸	number of trees per acre	five year intervals until stand is declared established or until 15 yrs.	fewer than 180 trees per acre well distributed throughout the stand 15 years after harvest
	post harvest evaluation	cutting units	site inspection	resource characteristics	within one month after termination or as soon as area is snowfree	sale plan/EA and stand prescription recommendations not met
	prethinning evaluation	all regenerated stands	stocking survey ⁸	stand condition, trees/acre	approximately 20 yrs. after stand has been declared established	crown competition is evident
	insect & disease survey	timber stands	aerial and ground observation by USDA Forest Pest Mgmt.	acres affected	annual	change in incidence and level of damage
	cover	all regenerated stands in MAs 4, 5, 6	site inspection	200 trees per acre 8 feet tall	begin 15 years after stand is declared established, continue at 5 yr. intervals until stand meets MA objectives	stand meets MA objectives, adjacent stands then become eligible for harvesting
	use	all authorized use areas i.e. timber sales, post & pole permits, etc.	site inspection	amount of use	minimum of once a week during logging and increased frequency as necessary during road building, slash disposal and reforestation; minimum once a month for post & poles	violation of contract specification

Element	Item	Location	Technique ¹	Unit of Measure	Frequency and Duration	Info. Warranting a Decision Change
Wilderness	progeny test plantation (data collection)	Top-O-Deep	as required by IETIC ⁹	standard quantitative measurements of survival, height, growth	every 5 yrs on tree growth	when data is no longer required or different data is required
	progeny test plantation (site protection)	Top-O-Deep	site inspection	trees showing pest damage	twice a yr.	increase in pest activity
	wilderness study areas	MA 8	monitoring by flight or vehicle based review	site disturbance	once per month during use season or more often if evidence occurs to warrant disturbance	evidence of unauthorized activity which degrades wilderness values will instigate an investigation and possible civil or criminal court action
Recreation	general recreation use	area wide with emphasis on dispersed use of undeveloped recreational sites	area inspection to look for vandalism, resource abuse, etc.	visitor days	twice per year e.g. once in June and once in Oct.	collected data reveals user conflicts, resource degradation, or safety hazards
	concentrated recreation use and demand	Garnet, heavily used trail heads, and winter trails	visitor registration at Garnet, traffic counters, and estimates	visitor days	counters to be checked biweekly during periods of heavy use, daily counts or estimates of use at Garnet by BLM or Garnet Preservation Association	collected data indicates increased visitor use/yr. or sustained use that requires additional or improved facilities
	road closure	area wide with emphasis on designated walk-in hunting areas	aerial reconnaissance and ground patrol	visitor days and violations	one fall and one winter flight per year, ground patrol of gates twice during periods of heavy use or more often if evidence occurs to warrant observation	on any given road closure gate, three violations are noted/season

Element	Item	Location	Technique ¹	Unit of Measure	Frequency and Duration	Info. Warranting a Decision Change
Water	water quality	area wide where management activities are occurring or to expand base-line data	standard USGS methods (or modified to meet specific conditions), field and laboratory analysis ¹³ done for selected stream basins that have continuous discharge measurements during the period April thru September or runoff period; automated suspended sediment sampling and continuous temperature measurements will occur in selected streams during the period April thru October	standard quantitative measurements for discharge, turbidity, conductivity, pH, suspended sediment, temperature, major ions, heavy metals, toxic materials	field measurements 10-15 times per year; major ions once a year; heavy metals and toxic substances as needed; base line data collected for five years prior to disturbance activities in basins without prior data; monitoring will continue throughout the activity period and for up to 4 years following completion of activities	water quality parameters which exceed state of Montana water quality standards; water quality measurements, especially suspended sediments, which render the water unsuitable for its classified usage
	soil moisture	selected fine-grained volcanic soils, coarse-grained plutonic soils, limestone soils, Belt Supergroup soils	manual sampling and gravimetric analysis	% by weight	once monthly June thru September	when regeneration is impaired due to inadequate soil moisture induced by silvicultural treatments
Soil & Site Productivity	compaction	Tertiary Age volcanic soils which will be and have been disturbed	use of Proving Ring Pentrometer	pounds per square inch	twice per year over a 5 year period	when compacted areas exceed 10% of ground surface and do not recover through natural process within 5 years
	habitat use	bald eagle reproduction & wintering sites. Peregrine, grizzly bear and wolf-as identified by occurrence reports and recovery plans	bald eagle by aerial and/or field survey; other species by direct/indirect observation	number of sitings	bald eagle reproduction survey, 6 surveys mid-March thru July; winter roost and forage, 2-3 times from Dec. thru Feb.; other species when reported	1-3 yr. downward trend in production or occupancy
Threatened and Endangered Habitats	habitat condition and trend	bald eagle MA 1, 2, 6, 12	Montana Bald Eagle Management Plan Survey levels ¹⁰	number of occupied/potential territories and roosts	once during base year and at 5-10 year intervals	1-3 yr. downward trend in suitable territory characteristics

Element	Item	Location	Technique ¹	Unit of Measure	Frequency and Duration	Info. Warranting a Decision Change
Nongame Habitat	use	raptor reproduction sites	nest site visitation and route surveys	number of birds or occupied nests	once annually prior, during and post resource activities	1-3 yr. downward trend in production or occupancy
Riparian Habitat	condition and trend	MA 1, 2, 9	photo plot, ¹² cover board Daubenmire ³ aerial photo (IR)	% of total surface area, habitat characters	frequently while gathering 1 yr. data base for: AMP's with unsatisfactory riparian, improvement category allotments with unsatisfactory riparian and MA2 with planned timber harvest; read once per cycle in pastures with grazing system and once every 4 yrs. for allotments with no cycle ie. same every year; read prior and once every year for 5 yrs. after timber harvest; monitor present satisfactory riparian when management action occurs	either deterioration or no improvement is noted in habitat that is presently in unsatisfactory condition, deterioration is noted in habitat presently in satisfactory condition
Big Game Habitat	seasonal habitat use	MA 3, 4, 5, 6, 9, 13	aerial survey, FWP data, traditional use areas, telemetry, and pellet group indices	distribution of big game animals and use	at least once before, during and after other resource activities	objectives for big game habitat not being met (see MA Goals)
	habitat component use	MA 1, 2, 4, 5, 6, 9	direct/indirect observation, time lapse photography	frequency and duration of use by big game animals	once a year for a 2-year data base, after activity period	objectives for big game habitat not being met (see MA Goals)
	seasonal habitat and component condition and trend	MA 3, 4, 5, 6, 13	tree, shrub, grass/forb Daubenmire ³ cover board, densiometer, chip/weight, point center quarter, ¹¹ production utilization, photo	% of annual growth and % change in vegetative structure and composition	each component at a 5 to 10 year interval for structural composition changes unless earlier alteration	objectives for big game habitat not being met (see MA Goals)

Element	Item	Location	Technique ¹	Unit of Measure	Frequency and Duration	Info. Warranting a Decision Change
Fisheries Habitat	use by native cutthroat, Dolly Varden, and other trout species	MA's 1, 2, and others where present	electro-shock, hook line, etc. as conducted by Montana Dept. of Fish, Wildlife and Parks	number and kind of fish per stream	to be coordinated with MDFWP information needs	a decline from the 3 yr. data base for native cutthroat
	habitat condition and trend for native cutthroat, Dolly Varden, and other trout species	MA's 1, 2, and others where present	stream habitat analysis form 6671-5	average % miles on BLM, pool/riffle, bank cover, bank stability	data base then once each 5-10 yrs.; also, pre and post disturbance survey	decline in habitat condition and trend
Minerals	use	MA 14	site inspection to determine adherence to 3809 regulations and monitor effects on other resources	resource characteristics	minimum of, biweekly during periods of operation and increased frequency during road building, etc.	violation of 3809 regulations, change from plan of operations or notice; unnecessary or undue degradation

¹ Monitoring activities between differing elements and within the same element will be conducted and/or coordinated so as to reduce duplications, travel time, etc. and thereby increase efficiency while reducing costs. The existing Studies Index System will also be used as a tool for tracking and scheduling monitoring plans.

² USDA. Soil Conservation Service. 1976. *National Range Handbook*. Washington D.C.

³ Daubenmire. 1959. "A Canopy Coverage Method of Vegetational Analysis." *Northwest Science*. 33(1): 43-64.

⁴ USDI. Bureau of Land Management. 1981. *BLM Manual*. Section 4430.5. Denver, CO.

⁵ USDI. Bureau of Land Management. 1984. *Rangeland Monitoring: Utilization Studies*. Technical Reference 4400-3. Denver, CO.

⁶ RAWS. Remote Automatic Weather Station operated by BLM.

⁷ NOAA. National Oceanic and Atmospheric Administration.

⁸ USDI. Bureau of Land Management. 1981. *BLM Manual*. Section 5705. Denver, CO and Butte District Policy Memo. April 12, 1982. "Reforestation Backlog Certification Standards-Manual Supplement."

⁹ IETIC. Inland Empire Tree Improvement Cooperative.

¹⁰ Montana Bald Eagle Working Group. 1983. *Montana Bald Eagle Management Plan* (draft). and Butte District Memo. July 25, 1984. "MBO Report-Bald Eagle." 68-40.3.

¹¹ Mueller. 1974. *Aims and Methods of Vegetation Ecology*. J. Wiley and Sons. New York, NY.

¹² USDI. Fish and Wildlife Service. 1981. "Riparian Trend Station; Adoption of Vegetation Profile Board."

¹³ USDI. Bureau of Land Management. 1980. "BLM-State of Montana Memorandum of Understanding."